



National Aeronautics and  
Space Administration

Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California

# Open Archival Information System Interoperability Framework (OAIS-IF)

## **Task Status**

CCSDS Data Archive Interoperability  
(DAI) Working Group  
15-19 October 2018

Steve Hughes



# Current Status

- The OAIS-IF model has been captured and is being managed using the Cornerstone Framework (NPO-49832).
  - *The entire OAIS-RM Information Model has been captured.*
  - *The entire OAIS-RM Functional Model has been captured*
  - *Additional functional elements have been captured from PDS4, RDA, ...*
  - *A CCSDS White Book is being auto-generated.*
- The model has been reviewed several times
  - *CCSDS (DAI) Working Group, Peter Shames.*
  - *The conclusion is that there is more than enough material for a Blue Book*
- The model has been updated for the Fall CCSDS meeting.
  - *The emphasis is to reorganize the material for a blue book.*
  - *Prototype development has started*



# Proposed FY19 Work

- Continue as editor of the OAIS-IF Blue Book.
  - *Prepare the OAIS-IF Blue Book for review at the Fall '18 and Spring '19 CCSDS meetings of the Data Archive Interoperability (DAI) Working Group.*
  - *Update the Blue Book based on review feedback.*
  - *Manage the CCSDS approval Blue Book process.*
- Lead development of the OAIS-IF prototype
- Continue support of CCSDS Standard Reviews
  - *ISO 14721:2012 (OAIS RM) - 2<sup>nd</sup> five year review*
  - *ISO 16363:2012 (CCSDS 652.0-R-1) - Audit and certification of trustworthy digital repositories.*
  - *Requires one 2 hour meeting per week.*



# Prior Accomplishments

- CCSDS Data Archive Interoperability (DAI) Working Group (CCSDS Fall 2017 Technical Meetings)
  - *Reviewed model*
  - *Incorporated review feedback*
- CCSDS Data Archive Interoperability (DAI) Working Group (CCSDS Spring 2018 Technical Meetings)
  - *Reviewed model*
  - *Incorporated review feedback*



# Prior Accomplishments

- Created a draft model of the Data Archive Architecture
  - *Adopted concepts from the following tasks and source documents.*
    - Data Archive Ingest (DAI) WG Report to the CCSDS Management Council (CMC), Figure 2: Notional Data Archive Architecture, March 2017
    - DAI Architecture Analysis, SEA System Architecture WG, Slide 16, Alternative Standardized Archive System Architecture Deployment Option (3), May 2017
    - Planetary Data System PDS4 Information Model Specification, Version 1.8.0.0, March 2017.
    - Planetary Data System - PDS4 System Architecture Specification September 1, 2013, Version 1.3.
    - CCSDS Reference Architecture for Space Information Management (RASIM) CCSDS 311.0-M-1
    - Reference Model for an Open Archival Information System (OAIS), ISO 14721:2012.
    - The Semantic Planetary Data System, PV2005, Edinburgh, November 2005.
    - PDS-D – The Planetary Data System Distribution Subsystem. Lunar and Planetary Science XXXIV (2003)
    - The Planetary Data System - Distributed Inventory System, IEEE Forum on Research and Technology Advances in Digital Libraries, 1999. Proceedings.



# Prior Accomplishments

- Utilize the Cornerstone Framework (NPO-49832) for model capture and management.
  - *Cornerstone is the framework used to capture and manage the PDS4 Information Model.*
  - *Provides a framework for model-driven information system development*
  - *Maintains Information Model independence.*
- Generated architectural documents for CCSDS DIA review
  - *Information Model Specification Document*
  - *UML Diagrams*
- Held review of model with P. Shames
  - *Reviewed UML and Specification Document*
  - *Updated model and documents based on feedback*



# Some System Components

● Classes   ■ Slots   ■ Forms   ◆ Instances   ▲ Queries

CLASS BROWSER

For Project: ● UpperModel\_171026\_ShamesUpdate\_CCSDS\_View

Class Hierarchy

- :THING
  - ▶ ● :SYSTEM-CLASS
    - ▶ ● Architecture\_Information\_Object
    - ▼ ● Architecture\_System\_Component
      - ▶ ● Access\_Aid
      - ▼ ● Application
        - ▶ ● Access\_Application
        - ▶ ● Administration\_Application
        - ▼ ● Archival\_Storage\_Application
          - Registry\_Service
          - Repository\_Service
          - Transfer\_Service
        - Consumer\_Application
      - ▶ ● Data\_Management\_Application
        - Ingest\_Application
        - Preservation\_Planning\_Application
        - Producer\_Application
    - ▶ ● Archive
      - Archive\_Abstraction\_Layer
    - ▶ ● Binding
    - ▶ ● Data\_Structure
    - ▶ ● Data\_Type
    - ▶ ● Interface
    - ▶ ● Method
      - Registry
      - Repository

CLASS EDITOR

For Class: ● Registry\_Service (instance of :STANDARD-CLASS)

Name

Registry\_Service

Documentation

The Registry\_Service class is the class of applications that provides services to ingest and manage registry objects. /jsh

Constraints

Role

Concrete ●

Template Slots

| Name  | Cardinality     | Type  |
|---|-----------------|---|
| has_GetInformationObject__Method              | required single | Instance of getInformationObject              |
| has_GetInformationObjectData__Method          | required single | Instance of getInformationObjectData          |
| has_GetInformationObjectMetadata__Method      | required single | Instance of getInformationObjectMetadata      |
| has_GetServiceStatus__Method                  | required single | Instance of getServiceStatus                  |
| has_Interface                                 | required single | Instance of Interface                         |
| has_RegisterInformationObject__Method         | required single | Instance of registerInformationObject         |
| has_ValidateInformationObjectData__Method     | required single | Instance of validateInformationObjectData     |
| has_ValidateInformationObjectMetaData__Method | required single | Instance of validateInformationObjectMetadata |
| uses_Archive_Abstraction_Service              | required single | Instance of Archive_Abstraction_Service       |



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CLASS BROWSER

For Project: ● UpperModel\_171026\_ShamesUpdate\_CCSDS\_View

Class Hierarchy

● :THING

▶ ● :SYSTEM-CLASS

▼ ● Architecture\_Information\_Object

● Access

● Administration

● Archival\_Storage

● Associated\_Description

● Bit

● Consumer

● Data\_Management

▶ ● Data\_Object

▼ ● Information\_Object

● Content\_Information

● Descriptive\_Information

▼ ● Information\_Package

● Archival\_Information\_Package

● Dissemination\_Information\_Package

● Submission\_Information\_Package

● Other\_Representation\_Information

▶ ● Package\_Description

● Packaging\_Information

▶ ● Preservation\_Description\_Information

● Representation\_Information

● Insert

CLASS EDITOR

For Class: ● Archival\_Information\_Package (instance of :STANDARD-CLASS)

Name

Archival Information Package

Documentation

Archival Information Package (AIP): An Information Package, consisting of the Content Information and the associated Preservation Description Information

Constraints

Role

Concrete ●

Template Slots

| Name                                | Cardinality       | Type                                   |
|-------------------------------------|-------------------|--|
| delimited_by                        | required single   | Instance of Packaging_Information      |
| described_by                        | required multiple | Instance of Package_Description        |
| described_by_Associated_Description | required multiple | Instance of Associated_Description     |
| has_Content_Information             | required multiple | Instance of Content_Information        |
| has_Data_Object                     | required single   | Instance of Data_Object                |
| has_Information_Object              | multiple          | Instance of Information_Object         |
| has_Representation_Information      | required single   | Instance of Representation_Information |





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- Laura Jewell - Engineering Data Management (EDM) task



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# **Thank You**

## **Questions and Answers**

**PDS homepage: <https://pds.nasa.gov/>**

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